

### REMARKS

Claims 1-7, 23, 25-27, and 32-34 are currently pending in the subject application and are presently under consideration. Claims 28-31 have been cancelled while claims 1 and 7 have been amended for better form. Entry of the herein amendments is respectfully requested since they do not add any new matter and, therefore, do not require new search or undue consideration. A listing of claims can be found at pages 2-5 of the reply.

In addition, applicants' representative thanks Examiner Le for the courtesies extended during the interview conducted on March 28, 2007. The merits of the claims vis-à-vis the cited references including those not relied on for rejections, were discussed. Further, the Examiner stated that the proposed amendments may be entered as they do not change the scope of the claims or raise new issues.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

#### **I. Rejection of Claims 1-7, 23, 25-26 and 32-34 Under 35 U.S.C. §103(a)**

Claims 1-7, 23, 25-26 and 32-34 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levinson, *et al.* (U.S. 6,098,408) in view of Cannell, *et al.* (U.S. 6,729,383). Withdrawal of this rejection is requested for at least the following reasons. The cited references, either alone or in combination, fail to teach or suggest all limitations of the subject claims.

To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, ***the prior art reference (or references when combined) must teach or suggest all the claim limitations.*** See MPEP §706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art and not based on the Applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The subject claims relate to a system for reducing stress in a semiconductor body by mitigating the formation of hotspots. A plurality of thermoelectric structures is employed to maintain a uniform temperature gradient throughout the semiconductor body. To this end independent claims 1, 7 and 34 recite similar features namely: ***at least one of the plurality of the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure.*** Neither Levinson, *et al.* nor Cannell, *et al.* teach or suggest such novel aspects.

Levinson, *et al.* relates to a system for regulating reticle temperature. It teaches employing a plurality of thermoelectric coolers mounted on a backplate of a chuck assembly. The cold side of the thermoelectric coolers is operatively couple with the backplate, and the backplate thermally conducts heat between the reticle and the thermoelectric coolers. However as conceded on page 3 of the Final Office Action dated January 30, 2007, Levinson, *et al.* does not teach or suggest a thermoelectric structure with a pattern of lines that is dense at the center and is progressively less dense towards the outer edges of the structure as recited in applicants' independent claims. The Examiner offers Cannell, *et al.* to overcome this deficiency. However, Cannell, *et al.* also fails to teach or suggest such novel aspects.

Cannell, *et al.* relates to methods and apparatus to cool electronic components and other objects, involving removal, absorption and/or dissipation of heat (See Cannell, *et al.* col.1 lines 11-16). Accordingly, a pin array is disposed between a surface region of a heat sink and the surface of an entity to be cooled. Cooling fluid flows between the heat sink's surface and the entity's surface region through the space occupied by the pins. The fluid is further agitated by the pins. At the cited portion, Cannell, *et al.* teaches that all conventional heat sinks which were observed effectuate some form of conductive heat transfer through a solid-on-solid interface with protrusive structuring intended to increase the heat sink's size parameters, thereby increasing the amount of heat transfer surface. Hence, according to Cannell, *et al.* it is the protrusive structuring that increases the overall heat transfer coefficient of the heat sink (See Cannell, *et al.* col.2 lines 43-45 and 49-55). In fact, nowhere does Cannell, *et al.* teach or suggest use of thermoelectric structures for heat dissipation let alone teach or suggest thermo-electric structures with the claimed line patterns.

In contrast to Cannell, *et al.*, the claimed subject matter relates to employing line patterns for thermoelectric structures to improve their heat dissipation characteristics. In accordance with

the claimed subject matter, a system comprising a plurality of thermoelectric structures to create a uniform temperature gradient is disclosed. At least one of these thermoelectric structures has a distribution of line patterns denser towards the center of the structure and less dense on the outer edges of the structure. In employing such a shape, the thermoelectric structure is able to better address localized heating problems within a semiconductor device such as hot-spots wherein high amount of heat is dissipated within a small area. The denser part of the thermoelectric device absorbs the larger amount of heat quickly when coupled with the hot-spots thereby creating a more uniform temperature gradient and reducing stress within the semiconductor device (*See* applicants' Figs. 2a and 2b and claim 33).

From at least the foregoing, it is clear the cited documents alone or in combination fail to teach or suggest all aspects recited in independent claims 1, 7 and 34. Therefore, it is requested that this rejection be withdrawn with respect to independent claims 1, 7, 34 and all the claims that depend there from.

## **II. Rejection of Claim 27 Under 35 U.S.C. §103(a)**

Claim 27 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levinson, *et al.* and Cannell, *et al.* (U.S. 6,729,383) as applied to claim 1 above and further in view of Ghoshal (U.S. 6,105,381). Withdrawal of this rejection is requested for at least the following reasons. Claim 27 depends on independent claim 1. The cited references, either alone or in combination, fail to teach or suggest all features of independent claim 1.

As stated *supra*, the subject invention is directed towards mitigating the formation of hotspots in a semiconductor body of an integrated circuit by creating a uniform temperature gradient. To this end, it employs a plurality of thermoelectric structures wherein at least one thermoelectric structure has a denser distribution of line patterns towards the center and less dense towards the outer limits of the structure. As stated on page 9 of the subject Office Action Levinson, *et al.* does not teach or suggest such claimed aspects. Ghoshal fails to make up for this deficiency of Levinson, *et al.* with respect to independent claim 1. Ghoshal relates to an apparatus for cooling selected elements within an integrated circuit by transmission of heat from the integrated circuit to a cold plate. This heat is removed from the cold plate to a hot plate by a thermoelectric cooler. Although, Ghoshal discloses a *passive* spiral coil thermally coupling two coolers (*See* Ghoshal col.3 lines 60-62) it not teach or suggest that ***at least one of the plurality of***

*the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure* as recited in the independent claim 1 from which the subject claim depends. In forming such a structure, the subject invention is better able to address localized heating problems such as formation of hotspots within the semiconductor body. From the foregoing, it is clear that the cited documents either alone or in combination do not teach or suggest all aspects of the subject claims. Therefore, this rejection with respect to claim 27 should be withdrawn.

### CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [AMDP812US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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